Attorney Docket No. 9100.2881 REI

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Peter A. Hochstein	)	
Application No.: 09/382,702	)	TC Art Unit: 2838
Reissue Filed: August 24, 1999	)	Examiner: Adolf D. Berhane
Original Patent: 5,661,645	)	
Issued: August 26, 1997	)	
For: POWER SUPPLY FOR LIGHT EMITTING DIODE ARRAY	)	Date: June 7, 2010

MAIL STOP APPEAL BRIEF – PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL OF REPLACEMENT REPLY BRIEF
RESPONSIVE TO EXAMINER'S REPLACEMENT ANSWER

Sir:

In response to the Replacement Examiner's Answer, mailed May 28, 2010, the applicant submits herewith as a Replacement Reply Brief a copy of his original Reply Brief, including an Evidence Appendix – Addendum with Exhibits K and L, dated October 13, 2010.

According to the communication accompanying the Replacement Examiner's Answer, this submission of the applicant's original Reply Brief will be considered a request by the applicant to reopen prosecution of the above-identified application before the examiner.

As the applicant's undersigned attorney has previously indicated to the examiner, the applicant would like to have a personal interview with the examiner prior to an office action subsequent to reopening prosecution. If the examiner reaches the application for action before being contacted to that end, he is requested to telephone the applicant's undersigned attorney so that an interview can be scheduled.

It is believed that no fees are due on account of this Replacement Reply Brief. However, any such fees may be charged to Deposit Account No. 14-1131.

All correspondence and telephone inquiries should be directed to the applicant's undersigned attorney.

Respectfully submitted,

David M. Quinlan, Esq.
Attorney for Applicant
Registration No. 26,641

DAVID M. QUINLAN, P.C.
32 Nassau Street
Suite 300
Princeton, NJ 08542
Telephone: (609) 921-8660
Facsimile: (609) 921-8651
E-mail: david@quinlanpc.com

Express Mail Mailing Label No. EH 954321970 US

Attorney Docket No. 9100.2881 REI

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Peter A. Hochstein	)	
Application No.: 09/382,702	)	TC Art Unit: 2838
Reissue Filed: August 24, 1999	)	Examiner: Adolf D. Berhane
Original Patent: 5,661,645	)	
Issued: August 26, 1997	)	
For: POWER SUPPLY FOR LIGHT EMITTING DIODE ARRAY	)	October 13, 2009

MAIL STOP APPEAL BRIEF – PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REPLY BRIEF

TABLE OF CONTENTS

REPLY BRIEF

I. INTRODUCTION

This Reply Brief is filed under 37 C.F.R. § 41.41.

The Examiner's Answer raises three points. Only one discusses the alleged *prima facie* obviousness of the appealed claims from the prior art. The other two present arguments not previously made.

A new examiner prepared the Examiner's Answer. The previous examiner was replaced after this appeal was taken. The new examiner discusses for the first time the evidence of patentability presented in the Declaration of Peter A. Hochstein, dated April 12, 2007 (Exhibit G in appellant's Evidence Appendix), which the previous examiner refused to do in three office actions and a notice of allowance (later withdrawn). The new examiner argues that the evidence fails to overcome the alleged *prima facie* obviousness of the appellant's claims, a contention the appellant strenuously opposes. However, the absence before now of any discussion of this evidence deprived the appellant of the opportunity to supplement the factual record to address any supposed deficiencies.

The Examiner's Answer also for the first time attempts to explain the relevance to the appealed claims of the opinion in *Relume Corp. v. Dialight Corp.*, 63 F.Supp.2d 788 (E.D. Mich. 1999), *aff'd*, 4 Fed. Appx. 893 (Fed. Cir. 2001) (Exhibit J in appellant's Related Proceedings Appendix). The court held original patent claim 6 invalid, but that claim is long since canceled. The previous examiner refused to discuss why that holding is relevant to the appealed claims. While the appellant disagrees with the new examiner's explanation, this Reply Brief represents the appellant's first opportunity to respond to this aspect of the previous examiner's rejection of the appealed claims.

II. ARGUMENT

A. The Prior Art Does Not Establish *Prima Facie* Obviousness

The crux of the argument that the applicant's invention would have been *prima facie* obvious is set forth in the Examiner's Answer as follows:

> Hildebrand circuit when the traffic light is off thereby preventing leakage current and that it completely removes the resistor (R7) for the circuit when the light is on.[1] This operation corresponds to that of the claimed conflict monitor compatibility circuit, which places the resistor (R5) in the circuit when the light is off and then completely removes the resistor (R5) form the circuit when the light is on.

Examiner's Answer at 13 ("Hildebrand" is U.S. Patent No. 5,075,601 to Hildebrand, Exhibit C in appellant's Evidence Appendix).

Returning to the actual claim language, representative claim 24 includes the following limitations:

> a low impedance load and a transistor in series connection with the low impedance load,
>
> the transistor being biased as a switch having an essentially nonconductive condition whenever the electrical input voltage is at or above the operating range lower limit voltage . . . , wherein:
>
> the transistor in the essentially nonconductive condition prevents dissipation of power from the power supply output through the low impedance load whenever the electrical input voltage is within the operating range . . . .

The quotation above from the Examiner's Answer echoes a similar statement in the office action of January 22, 2009. The appellant's Appeal Brief, at 11-12, explains why the examiner is wrong. The Examiner's Answer simply ignores the appellants' explanation.

In a nutshell, Hildebrand's Fig. 4 shows that Hildebrand's resistor R7 in fact is not removed from the circuit for a significant portion of the operating range of the electrical

---

1. Rather than separately identify the sentence fragments and typographical errors in the Examiner's Answer, the appellant will simply quote it *verbatim*. The Appeal Brief contains a typographical error at page 3, line 7, where "comparability" should read --compatibility--.

input voltage. Appeal Brief at 11-12. (A typical LED input voltage operating range is about 85-140 volts; *see* appellant's specification at col. 6, lines 29-30.) The dot-dash line in Hildebrand's Fig. 4 shows the current through the MOSFET Q3 and thus through the resistor R7 in series with it. *See* Hildebrand, col. 6, lines 7-16, Declaration of Peter A. Hochstein, dated April 12, 2007 ("the Hochstein Declaration"; Exhibit G in appellant's Evidence Appendix), para. 23. According to Fig. 4, Hildebrand's resistor R7 still passes as much as eight milliamps of current at the low end of an LED's operating range.

Even so, the plot in Fig. 4 is more schematic than real. Mr. Hochstein tested an "exact copy"[2] of the circuit disclosed in Hildebrand. Declaration of Peter Hochstein, dated December 1, 1998, in *Relume Corp. v. Dialight Corp., supra* ("the previous Hochstein Declaration"; copy enclosed as Exhibit K in appellant's Evidence Appendix – Addendum, *infra*), para. 14. Concerning Hildebrand's Fig. 4, Mr. Hochstein found:

> [I]n testing the Hildebrand circuit, we discovered that Figure 4, while generally accurate in the shape of the pertinent curves, significantly understates dissipated current.

Previous Hochstein Declaration, para. 15.

Exhibit B of the Hochstein Declaration (Exhibit 4 of the previous Hochstein Declaration) shows that the actual amount of current conducted through Hildebrand's MOSFET Q3 and its series-connected resistor R7 at an input of 85 volts is more like 48 milliamps, not eight as suggested in Hildebrand's Fig. 4. Thus, Hildebrand's MOSFET Q3 is not in "an essentially nonconductive condition whenever the electrical input voltage is at or above the operating range lower limit voltage," as required by appellant's claim 24.

---

2. The Examiner's Answer says that "Hildebrand choice of values was not stated in the specification." Examiner's Answer at 17. This is not the case; Hildebrand does specify the properties of the resistors, capacitors, Zener diodes, and MOSFET transistors used in its circuit.

Hochstein Declaration Exhibit B also includes a plot entitled "Power Dissipation" showing that Hildebrand's circuit dissipates about four watts of power at an input voltage of 85 volts. Accordingly, Hildebrand's MOSFET Q3 also fails to meet claim 24's requirement that "the transistor in the essentially nonconductive condition *prevents dissipation of power* from the power supply output through the low impedance load *whenever the electrical input voltage is within the operating range.*" As pointed out by Mr. Hochstein, four watts is a significant fraction of the total power consumed by an LED, and power dissipation of that magnitude would defeat one of the purposes of using LEDs in the first place, namely their low power consumption. Hochstein Declaration, para. 26.

B. The Hochstein Declaration Confirms Patentability

The Examiner's Answer refuses to accord any weight to the Hochstein Declaration under the following reasoning:

> The Hochstein Declaration has been considered, the information is only partially correct because Appellant only tested the Hildebrand's circuit. Examiner applied Johnson reference (5,463,280) in view of Applicant Prior Art (Fig. 1) and further in view of Hildebrand (5,075,601). Therefore it would be incorrect to test the output of Hildebrand circuit only and make a comparison with Appellant circuit. In response to Appellant' piecemeal analysis of the reference, it has been held the one can't show non-obviousness by attacking references individually where, as here the rejections are based on combination of references. *In re Keller*, 208, USPQ 871 ([CCPA]1981)."

Examiner's Answer at 16-17.

This reasoning is faulty on several counts. First, it misses a main point of the Hochstein Declarations, which is to show that Hildebrand's circuit fails to meet important limitations in the appellant's claims. A combination of references used to reject a claim must show the obviousness of every claim limitation. *Ex Parte Wada*, Appeal 2007-3733

(Bd. Pat. Apps. & Interf. 2008; copy enclosed as Exhibit L in appellant's Evidence Appendix – Addendum, *infra*). As discussed above in section A, the factual record clearly establishes that a combination of the cited references would not have included all of the appellant's claim limitations.

In re Keller, 642 F.2d 413, 208 U.S.P.Q. 871 (Fed. Cir. 1981), cited by the examiner, dealt with a different issue. There, the applicant submitted expert testimony that it would not have been obvious to combine the cited references, which together showed all of the claim limitations. Here, the appellant's position, borne out by the factual record before the examiner, is that the applied combination of references, even if it had been obvious, still fails to include all of the appellant's claim limitations. Nowhere does the Examiner's Answer (or anything said by the previous examiner) suggest that it would have been obvious to modify Hildebrand's circuit to meet the appellant's claims, or that there would have been any reason to do so. *See also* Hochstein Declaration, para. 27.

And in any case, evidence of superior performance of an invention as compared to the prior art need not test the combination of references used to reject the claims. Only the properties of the closest prior art must be tested. The measure of what constitutes the "closest" prior art generally comes down to the single reference with the greatest number of features in common with the claimed invention. *In re Merchant*, 575 F.2d 865, 197 U.S.P.Q. 785 (CCPA 1978). There is no question that Hildebrand's circuit tested by Mr. Hochstein meets more of the appellant's claim limitations than any other reference. Hildebrand's circuit not only includes the dynamic load circuit that allegedly corresponds to the appellant's claimed conflict monitor compatibility circuit, but also includes a rectifier (col. 2, lines 22-33) and a power supply (col. 4, lines 1-15). Compare that with appellant's

claim 24, which includes a rectifier and a power supply along with the conflict monitor compatibility circuit.

One final point here: in a normal prosecution the appellant would be discussing the sufficiency of the factual record for the first time with the examiner rather than in a Reply Brief. However, the previous examiner steadfastly refused to have such a dialogue. The present examiner finally addressed the appellant's factual showing in his Examiner's Answer, so the appellant has never had an opportunity to explore the possibility of supplementing the factual record to address any perceived deficiencies.

Nevertheless, the appellant believes that the factual record fully supports the patentability of the appealed claims.

C. The Prior Court Decision is Irrelevant to the Appealed Claims

Another assertion made during the prosecution of this application is that somehow the court's holding that original patent claim 6 is invalid, *see Relume Corp. v. Dialight Corp., supra*, is relevant to the very different claims on appeal. The previous examiner simply invoked the decision, and the court's holding that Hildebrand showed the means-plus-function limitations in patent claim 6, as support for his rejections. The Examiner's Answer finally attempts an explanation of that position:

> Appellant alleges difference between the claimed language "conflict monitor compatibility circuit and original claim 6's "adaptive clamp means" and "voltage sensing means" and a "controlled load means". If Appellant alleges such a difference, then appellant needs to provide support for such a difference. Since the original patent doesn't make such a distinction or provide wording such as "conflict monitor compatibility circuit" is would be new matter if appellant chooses to give a different definition. For the purpose of the appeal the conflict monitor compatibility circuit is an adaptive clamp means (which is a voltage sensing means and a controlled load means).
>
> Therefore the court decision is still valued for the appeal claims.

Examiner's Answer at 22-23.

Presumably, the examiner has reference to 35 U.S.C. § 112, sixth paragraph, which provides that claim elements in means-plus-function form "cover the corresponding structure, material, or acts described in the specification *and equivalents thereof*" (emphasis supplied). The same disclosure that supported patent claim 6's means-plus-function elements cited in the Examiner's Answer likewise support features of the now-claimed conflict monitor compatibility circuit. But that does not mean the claims have the same scope.

The logical flaw in the examiner's reasoning is that it fails to account for the fact that patent claim 6 included not only the structure disclosed in the specification corresponding to the means-plus-function claim elements, but equivalents of that structure as well. Indeed, absent some reason not to, the examiner could well take Hildebrand's MOSFET Q3 as an equivalent of the transistor Q2 shown in the appellant's Fig. 6b. However, appealed claim 24 (and the appellant's other claims) now explicitly recite:

> the transistor [Q2] being biased as a switch having an essentially nonconductive condition whenever the electrical input voltage is at or above the operating range lower limit voltage . . . , wherein:
>
> the transistor in the essentially nonconductive condition prevents dissipation of power from the power supply output through the low impedance load whenever the electrical input voltage is within the operating range . . . .

The examiner may not ignore those limitations on the grounds that they are one way of implementing the means-plus-function elements of patent claim 6. Under the sixth paragraph of §112, the means-plus-function elements covered other implementations ("equivalents") as well. Now, however, the appellant's claims are explicitly limited to structure that is not shown in Hildebrand, and those limitations render the appellant's claims patentable.

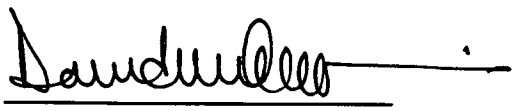
The functional recitations in the appealed claims distance them still further from patent claim 6. Claim 24 includes detailed recitations of what happens to the various circuit components under various conditions. The functions now recited in the appealed claims were completely absent in patent claim 6, which means the baseline for determining the scope of the respective claims is now completely different. Put simply, invalidated claim 6 recited much broader functions, and by extension, much broader structure.

Accordingly, the court's opinion is *not* "still valued for the appeal [*sic*] claims."

III. CONCLUSION

The appellant believes that the Examiner's Answer fails to establish the unpatentability of appealed claims 24, 28, 32, 37, 38, 41, 42, 44, and 46-53, and their allowance is respectfully requested.

Respectfully submitted,



David M. Quinlan, Esq.
Attorney for Applicant
Registration No. 26,641

DAVID M. QUINLAN, P.C.
32 Nassau Street
Suite 300
Princeton, NJ 08542
Telephone: (609) 921-8660
Facsimile: (609) 921-8651
E-mail: david@quinlanpc.com

EVIDENCE APPENDIX – ADDENDUM

EXHIBIT K ..... Declaration of Peter A. Hochstein, dated December 1, 1998

EXHIBIT L ..... *Ex Parte Wada*, Appeal 2007-3733 (Bd. Pat. Apps. & Interf. 2008)

Source of Exhibit K (37 C.F.R. § 41.37(c)(1)(ix):

Information Disclosure Statement of December 7, 1999 (reference AV, "Exhibits in Support of Relume's Opposition to the Motion for Summary Judgment of Invalidity for Obviousness of Lumileds Lighting BV, Philips Lighting VB and the Hewlett-Packard Company, Case No. 98-72360, made of record by the examiner in the office action of March 24, 2000.

EXHIBIT K

THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF MICHIGAN

RELUME CORPORATION Plaintiff, v. DIALIGHT CORPORATION, ECOLUX, INC., PRECISION SOLAR CONTROLS, INC. LUMILEDS LIGHTING BV, PHILIPS LIGHTING BV, and HEWLETT-PACKARD COMPANY, Defendants.	Case No. 98-72360 Judge John Feikens Magistrate Judge Thomas A. Carlson

DECLARATION OF PETER HOCHSTEIN

1. My name is Peter Hochstein. I submit this Declaration in support of Relume's reply brief on the preliminary injunction motion. I earlier submitted my declarations in connection with the opening brief. The following information is based on my personal knowledge and I am competent to testify as to it at trial or hearing.

2. This Declaration is addressed to three general topics: (1) defendants' infringement, (2) the validity of the '645 and '909 patents, and (3) misstatements of fact about what I told the industry at ITE performance specification committee meetings.

3. First, I disagree with defendants' joint contention of non-infringement of the '645 patent. I have reviewed defendants' position that the absence of a ballasting resistor in their LED array precludes infringement. This is incorrect. For one thing, my claims do not require a ballasting resistor. No mention is made of such resistors in the LED array claim element. Second, the "corresponding structure" of the LED array does not include the ballasting resistors as described in

the patent specification. It merely includes the parallel strings of series connected LEDs. (See '645 Patent, 6:24-25). Third, even if the corresponding structure included ballasting resistors, their absence, if at all, in the accused devices is not a substantial difference from their presence in the context of the LED array element. This is because the LED array element functions to produce light. Resistors per se do not produce light. Finally, in some sense, current sensing resistors (which all defendants have) perform a ballasting function, albeit small. For all these reasons, I do not agree that the lack, if any, of ballasting resistors is relevant at all to defendants' infringement.

4. Next, I disagree with defendants' joint contention that they do not have voltage regulation. Attached as Exhibit 1 to this Declaration is a chart based on analysis conducted under my supervision of all of defendants' accused products. It shows that as a.c. input voltage is varied over the specified range of 80 to 135 volts r.m.s., d.c. output voltage remains essentially constant, i.e., less than a 5% total variation for an input voltage change of over 68%. This is the sense in which I used the term "voltage regulation" in my written description. (E.g., '645 Patent, 10:14-17). Indeed, Exhibit K in our original filing contains Dialight's admission that their 432 Series signals "feature Voltage Regulation."

5. I understand that defendants' wish to construe my "voltage regulation" language as limited to (1) constant output voltage with variation in load impedance, (2) constant output voltage with variation in ambient temperature, or (3) a power supply structure that does not utilize current sense circuitry. I did not mean for any of these to be the exclusive definition of "voltage regulation." In fact, the primary function of my voltage regulation circuitry is to accommodate the very large differences in a.c. power line voltage over which the LED signal must operate. Defendant's definition number 1 defines a fault condition, i.e., either shorting or opening one or more LEDs in

the array. It ignores the normal operating condition that load impedance (and hence voltage) is expected to stay constant. Definition number 2 simply does not address the objective of maintaining constant light output over a wide range of a.c. input voltages. Definition 3 offers a structural, not a functional, definition of voltage regulation, and hence does not apply. It also fails on its own terms, since defendants' power supply parts actually do measure or sense voltage. Voltage is directly proportional to the current flowing in the sense resistors, and the particular input pin coupled to the sense resistors senses voltage (V-in), not current.

6. I now address defendants' arguments directed to validity. First, I disagree that the '909 patent is invalid over the Fujitsu reference. I have specifically focused on claim 9. The reference is not directed to my field of art (safety critical outdoor LED signals). ('909 Patent, 1:9-10). Rather, it is directed to "light sources for illumination," and particularly "facsimiles, image scanners, and copiers etc." These LEDs are not designed to be perceptible by people in ordinary operating conditions, but instead are designed to be detected by electronic photo sensors. It is the nature of such detectors to be more responsive to pulsed LEDs rather than continuously operating LEDs. It is a design goal for systems such as that disclosed in the Fujitsu reference to optimize the signal to noise ratio by concentrating the radiant energy into a relatively narrow high peak power pulse, rather than a filtered or otherwise substantially d.c. radiation. Pulsing without filtering is common practice in machine vision applications.

7. My field of work was far removed from machine vision. In my '909 patent, I endeavored to solve the problem of making LED traffic signals safer, and more functionally equivalent to incandescent bulbs. The Fujitsu reference is not in this field of endeavor. Further, since the Fujitsu reference it is directed to the problem of optimizing machine detection of reflected

light, is not reasonably pertinent to the problem of optimizing the safety of safety-critical outdoor signaling devices as was my '909 invention.

8. In addition, I understand that the pertinent standard for determining whether an invention is invalid for obviousness is whether, at the time of the invention, one of ordinary skill in the relevant art would have found the differences between the prior art and the claimed invention to have been within his level of skill to bridge, and there is some teaching, suggestion or motivation in the art to bridge such differences. I disagree that an initial case of obviousness has been made. I consider that the relevant art is traffic signal technology. I believe the level of ordinary skill is a bachelor's degree in electrical engineering, with two to four years of experience in the field.

9. More specifically, it is well known that the specific type of detector that would be employed with the Fujitsu illumination circuit is a pulse sensitive detector. See Exhibit 2, attached hereto. To insert a filter in the Fujitsu circuit would be contrary to high power efficiency and optimal S/N ration. This is because such a filter would reduce the a.c. (pulse) component in the signal, and therefore would interfere with the operation of the a.c. (pulse) detecting circuit. Insertion of such a filter would tend to spread the pulse, resulting in lower "detectable" power. While d.c. detection is certainly possible, such d.c. operation of optical detectors is not consistent with drift free, high S/N ratios which are naturally desirable. If d.c. detection were to be used, the new "filtered" level would have to be made equal to the previous "peak" level, greatly reducing efficiency. Nothing in the Fujitsu reference suggests this is a good idea, since it would undermine efficiency. From this I conclude that Fujitsu teaches one of ordinary skill in the art away from the addition of a filter. Therefore, I conclude that the Fujitsu reference would not have rendered my '909 invention, claim 9, obvious.

10. Using the same standards, I also disagree that the '645 patent would have been obvious over the prior art. I specifically focus on claim 5. I understand that the defendants are asserting that a combination of the Johnson patent, Figure 8, and the Hildebrand patent would have rendered claim 5 obvious. For several reasons, this is incorrect.

11. First, the asserted combination does not result in the claimed invention. Notably, there is no LED array in Figure 8 of the Johnson patent (as recited in my LED array claim element), since it depicts a simple series string. Various industry specifications prohibit implementation of such a topology because a single point failure will result in complete loss of light. This problem is addressed in column 1 of my '645 patent.

12. In addition, the Hildebrand patent does not meet the "adaptive clamp" limitation, since the Hildebrand circuit is neither adaptive, nor a clamp. My "adaptive clamp" as claimed in the '645 patent requires that its circuitry switch in and out below and above a certain input voltage, 40 volts r.m.s. in the preferred embodiment. ('645 Patent, 6:39-45). That is what makes it "adaptive." By contrast, there is no such switching disclosed in the Hildebrand circuit.

13. Further, my "adaptive clamp" as claimed requires that its circuitry "clamp," i.e., maintain at prescribed levels the input voltage when operating (10 volts r.m.s. in the preferred embodiment). By contrast, Hildebrand describes itself as a "dynamic load circuit." This is not a clamp. Further, mere inspection of its circuit characteristics as shown in Figure 4 proves that Hildebrand is essentially linear over its operating range, and is necessarily dissipative.

14. Under my supervision, an exact copy of the Hildebrand circuit was built and tested. None of the measured parameters would permit this device to be used in any sanctioned LED traffic signal. The Hildebrand circuit does not address power factor and harmonic distortion. In fact, due

to its use of a large capacitor that my '645 patent specifically avoided ('645 Patent, 8:2-3), the total harmonic distortion and power factor performance of the Hildebrand circuit is poor. In our tests, we placed a completely resistive load across the Hildebrand circuit in order to learn its optimal circuit characteristics. Even with a purely resistive 15 Watt load (which is more forgiving than a typical LED load), we measured a power factor of 0.71 and total harmonic distortion of 89.9%. Exhibit 3 shows a chart comparing this poor performance with the performance of a circuit constructed according to the teachings of the '645 patent, and with the pertinent industry specifications.

15. Another poor characteristic of the Hildebrand circuit is that it dissipates significant power in the input voltage operating range of 80 to 135 v.a.c. Exhibit 4 shows (1) a graph of power dissipation of both the Hildebrand circuit and my adaptive clamp and (2) a graph of current consumed as a function of input voltage for both the Hildebrand circuit and my adaptive clamp. These graphs show that between 80 and 135 v.a.c., especially on the lower end of the operating range, the Hildebrand circuit exhibits a significantly greater waste of energy than does the '645 adaptive clamp. At 80 v.a.c., the wasted power is as much as 4 Watts (compared to 0.25 Watts in the '645 adaptive clamp), which may amount to about 50% of the power consumed by a 200 mm red LED traffic signal. Incidentally, in testing the Hildebrand circuit, we discovered that Figure 4, while generally accurate in the shape of the pertinent curves, significantly understates dissipated current.

16. For all these reasons, the Hildebrand circuit is thus totally incompatible with the stated purpose of my '645 patent to maximize power factor, minimize total harmonic distortion, and minimize parasitic dissipation. I conclude that the respective circuits are not only not interchangeable, but one of ordinary skill (or any skill) in the art would never have considered using the Hildebrand circuit topology in combination with a power factor corrected LED array. Nor would

one of ordinary skill have been motivated or taught to modify the Hildebrand circuit (or the Johnson Figure 8 circuit) to arrive at my invention of claim 5. The Hildebrand circuit was directed to neon and flourescent illumination elements, in which power factor is so low and total harmonic distortion is so high that the deleterious effects of adding the Hildebrand circuit to such an arrangement went unnoticed. Nowhere does Hildebrand, or Johnson, suggest an appreciation of the unique problems associated with power quality in an LED traffic signal.

17. I believe it is also pertinent that Dialight just received U.S. Patent No. 5,833,355 on November 10. It is based on applications filed in January and August, 1996, respectively. I have reviewed the electrical schematic in Figure 5 of that patent. It represents the state of the art before my developments. Notably, there is no power factor correction, no voltage regulation, no current regulation and no adaptive clamp. Attached as Exhibit 5 are true and correct copies of patents acquired by Ecolux, Precision Solar and Dialight. These patents relate to LED traffic signal technology. Each of these defendants are members of the ITE and its relevant LED traffic signal committees.

18. On a separate issue, I understand that defendants are relying on Relume's alleged failure to pass the Caltrans specification. Defendants are apparently referring to a weight requirement (2 kg) that did not exist at the time Relume submitted its product for evaluation under the Caltrans specification. I believe that weight requirement materialized after this case was filed. See Exhibit 6, August 17,1998 Caltrans specification; Exhibit 7, August 2, 1998 Letter from Peter Hochstein to Caltrans.

19. Attached as Exhibit 8 is a true and correct copy of a form I received and returned completed in February 1998 to the ITE. It includes a reference to my '645 patent under the heading

"PUBLIC STATEMENTS AND POSITIONS." Thus, I formally disclosed my '645 patent to the ITE at least as early as February 1998.

20. Before any of Relume's patent applications issued as patents, their contents were kept secret consistent with good business practice. Relume considered them to contain trade secrets.

21. During the pendency of such patent applications, including those that led to the '909 and '645 patents, I did not know whether I or Relume would ever receive an issued patent. As I understand it, Relume had no patent rights until the issue dates of such patents.

22. It has never been the practice of ITE members to exchange, or otherwise discuss, pending patent applications.

23. I understand that defendants contend that I and Relume misled them into thinking that Relume would never assert its patent rights against them, based on my membership on various ITE committees. I am dumbfounded by this, particularly since I never tried to hide the fact that I and Relume were seeking patents for our advances. If Relume had any idea that its membership on various ITE committees would later be construed as a grant of a royalty free license to practice its trade secrets and patents, it would never have joined such committees.

24. For example, I recall an ITE meeting that occurred on April 27, 1997 at the Washington, D.C. headquarters of the ITE. I was one of about 30 people at that meeting. I recall that representatives of all defendants were in attendance there. After Dr. Berry Koch of LumiLeds gave a technical presentation on the severe thermal environment of LED traffic signals, a general discussion commenced. During this discussion, a representative of one of the LED signal manufacturers (I believe it was a representative of McCain Traffic Supply) pointed out that the addition of luminous antidiminution circuitry in LED traffic signals was difficult or impossible. I

addressed that comment by telling the committee that it was not impossible and Relume had developed a proprietary means to accomplish that goal. I also mentioned Relume had a pending patent application involving such antidiminution circuitry. At that point, a brief and spirited discussion ensued where one members attending the meeting stated his objection to Relume acquiring patents that might impact his business. I then addressed Jim Keaton of 3M, a co-chair of the committee, and specifically asked him if he believed that Relume was justified in patenting some of the technology we had developed. His response was that he saw no problems arising from such endeavors, and the issue was not discussed any further.

25. Finally, I understand that Defendants argue the following paragraph shows Relume is acquiescing in defendants' infringement of its patents:

> We are submitting the proposed specifications in good faith, and do not intend to use them for competitive advantage. Relume will make available any proprietary technology to the rest of the Industry in order to improve the acceptability, functionality and reliability of L.E.D. traffic signal devices.

This paragraph is the last paragraph in a letter I submitted to Jon Frank, acting committee chair of the relevant LED signal ITE committee at the time, July 1995. At this date, we had not yet filed our applications that led to the '645 and '909 patents.

26. Defendants are taking my words out of context. This statement when taken in context was intended to convey that Relume's initial proposed specifications (which do not remotely resemble the final ITE specifications that were published three years later) did not describe any existing Relume product, but rather represented my perception of how a high quality LED traffic signal ought to perform. As the rest of my letter clearly reveals, I simply wanted to contrast what I was doing (i.e., proposing a specification that set a high standard for quality and performance) from

what I perceived others in the industry were doing (i.e., proposing a specification that conformed to existing product, regardless of quality). As for "making available" proprietary technology, Relume has done just that in its repeated exclusive licensing offers, commencing as early as October 1997. Thus, I never expected that anyone would treat my committee work in attempting to make LED traffic signals safer and more efficient as any kind of acquiescence or abandonment of proprietary rights. In fact, I used the word "proprietary" deliberately to telegraph that Relume considered its technical advances to be proprietary.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: December 1, 1998

Peter Hochstein

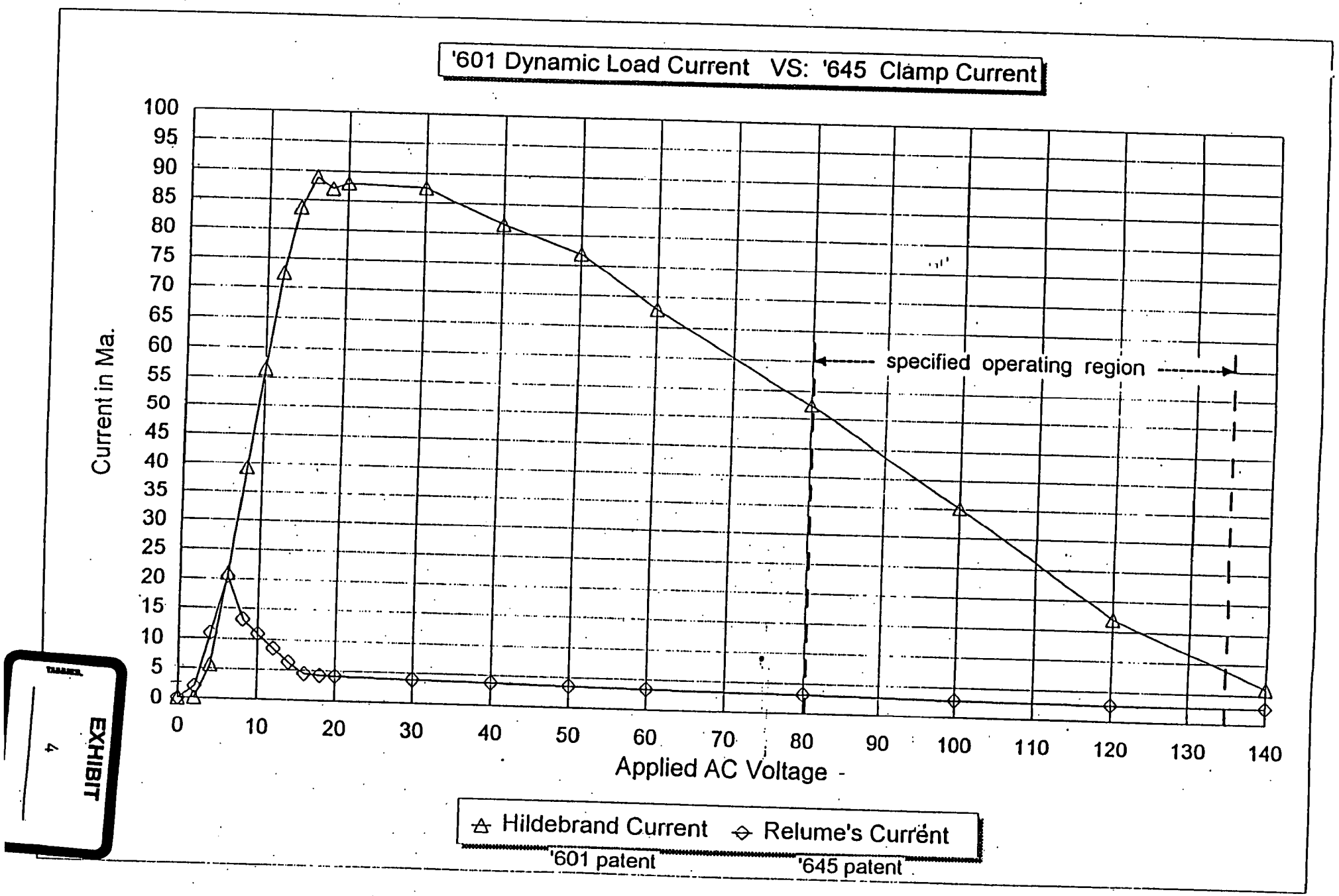
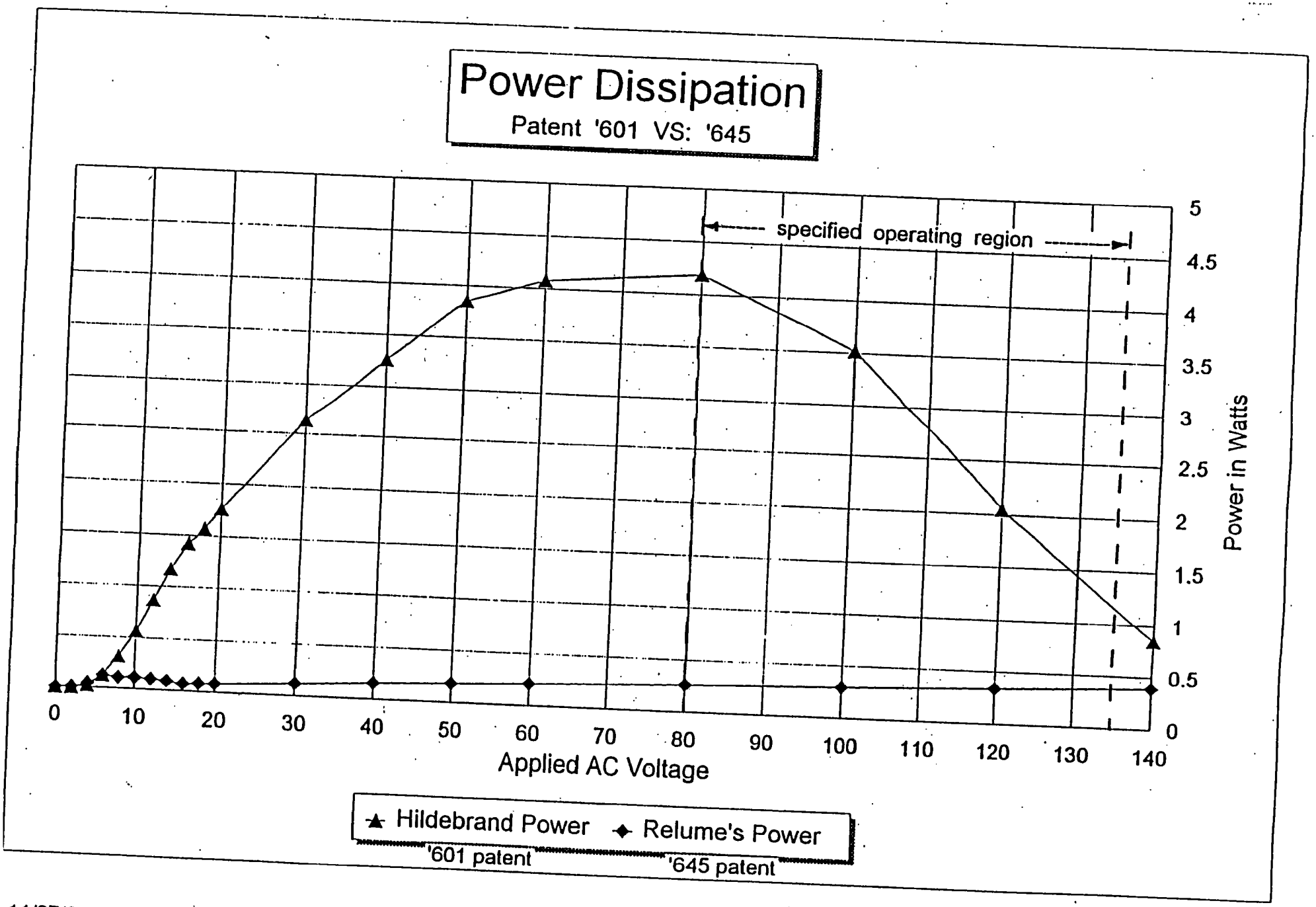


EXHIBIT 4

11/27/98 02:33 PM

4N50PAT4.WK4



11/27/98 02:22 PM

4N50PAT4.WK4

EXHIBIT L

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte H. GARRETT WADA, and MATTHEW B. MURPHY

Appeal 2007-3733
Application 10/613,220
Technology Center 1600

Decided: January 14, 2008

Before DEMETRA J. MILLS, ERIC GRIMES, and FRANCISCO PRATS, *Administrative Patent Judges*.

PRATS, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 involving claims to a system for detecting a component of interest in a biological sample. The Examiner has rejected the claims as obvious. We have jurisdiction under 35 U.S.C. § 6(b). We reverse.

STATEMENT OF THE CASE

THE INVENTION

Detecting a DNA molecule or protein of interest in a biological sample is "of fundamental value in, e.g., diagnostic medicine, archaeology,

anthropology and modern criminal investigation" (Spec. 1). Thus, the Specification discloses "devices, systems, and kits for detecting a component of interest in a complex mixture" (*id.* at 2).

Claims 1-23 are pending and on appeal (App. Br. 2).[1] Claim 1 is representative and reads as follows:

> 1. A system for detecting a component of interest in a sample, the system comprising:
>
> (i) a microfluidic device comprising:
>
> (a) a first microscale channel comprising a gel filled component separation region;
>
> (b) a second microscale channel downstream from the first channel that is fluidly coupled to the first channel, the second channel configured to contain a particle set therein;
>
> (c) a binding region fluidly coupled to or within the first channel;
>
> (d) a source of a component-binding moiety fluidly coupled to the binding region which is capable of binding to the component of interest;
>
> (e) a first detection region within the first channel; and
>
> (f) a second detection region within the second channel which includes a particle stacking region within the second detection region;
>
> (ii) a fluid direction system fluidly coupled to the microfluidic device, which fluid direction system is configured to transport the sample through at least the first and second microscale channels;
>
> (iii) a control system operably linked to the fluid direction system, which control system is configured to instruct the fluid direction system to deliver or transport the sample through at least the first and second microscale channels; and

---

[1] Appeal Brief filed February 8, 2007.

(iv) a detection system which is configured to be positioned proximal to the first and second detection regions.

THE REJECTION

The Examiner applies the following documents in rejecting the claims:

Nelson	US 6,007,690	Dec. 28, 1999
Spence	US 6,540,895 B1	Apr. 1, 2003

The following rejection is before us for review:

Claims 1-23 stand rejected under 35 U.S.C. § 103(a) as being obvious in view of Nelson and Spence. (Ans. 3-5).

ISSUE

The Examiner cites Nelson as disclosing "microfluidic devices comprising several alternative embodiments" (Ans. 3). The Examiner contends that several of Nelson's embodiments meet most of the limitations recited in claim 1 for the microfluidic device (*see id.* at 3-4).

The Examiner concedes that Nelson "does not particularly point out a control system linked to the fluid direction system" (*id.* at 4). Pointing out that Spence "teaches cell sorting utilizing microfluidic systems controlled by a computer or microprocessor that control fluid flow," the Examiner contends that one of ordinary skill would have considered it obvious "to modify the teachings of Nelson et al to include a control system to instruct fluid direction as taught by Spence et al because procedures can be programmed using any suitable software that can perform a variety of functions" (*id.* at 5 (citing Spence, col. 15, ll. 5-27)).

Appellants contend that neither of the cited references discloses or suggests all of the limitations in claim 1 (App. Br. 5). Specifically,

Appellants argue that they "are unable to identify any structure taught by Nelson that corresponds to Applicants' claimed 'source of a component-binding moiety fluidly coupled to the binding region'" (Reply Br. 5). Appellants further contend that "Spence is silent with regard to a channel comprising a gel filled component separation region and so cannot teach a source of a component-binding moiety fluidly coupled to a binding region that is fluidly coupled to or within such a channel" (*id.* at 5-6).

The issue with respect to this rejection, therefore, is whether the Examiner has shown that a device having the configuration of features recited in claim 1, including the "source of a component-binding moiety fluidly coupled to the binding region," would have been obvious to one of ordinary skill in the art.

FINDINGS OF FACT

1. Claim 1 recites a system having the following components:

(i) a microfluidic device having a specified arrangement of two channels and several regions;

(ii) a fluid direction system fluidly coupled to the microfluidic device, the fluid direction system being configured to transport a fluid sample through the two channels;

(iii) a control system operably linked to the fluid direction system, the control system being configured to instruct the fluid direction system to transport the sample through the two channels; and

(iv) a detection system configured to be positioned proximal to first and second detection regions in the microfluidic device.

2. Claim 1 requires the microfluidic device component to have:

(a) a first microscale channel having a gel-filled region for separating components within a sample;

(b) a second microscale channel downstream from the first channel, the second channel being fluidly coupled to the first channel and also configured to contain a particle set;

(c) a binding region which is fluidly coupled to the first channel, or which is within the first channel;

(d) a source of a component-binding moiety fluidly coupled to the binding region, the component-binding moiety being capable of binding to a component of interest;

(e) a first detection region within the first channel; and

(f) a second detection region within the second channel, the second detection region including a particle stacking region.

3. Because the "source of a component-binding moiety . . . capable of binding to the component of interest" must be "fluidly coupled to the binding region," we interpret claim 1 as requiring the "source" to be a separate structure from the binding region. This interpretation is consistent with the Specification, which discloses a particle well 112, fluidly coupled to binding channel 110 (Spec. 12; *see also* Figure 1). The Specification discloses that the "particle set is released from particle well 112 into binding channel 110. The particle set with the components [of interest] attached or adsorbed onto the particle member types is then directed to detection region 114, where the particle member types of the particle set are optionally stacked" (Spec. 12; *see also* Figure 1).

4. Nelson describes microfluidic devices useful in separating and detecting compounds of interest in a number of applications, including "high throughput screening, for genomics and pharmaceutical applications such as gene discovery, drug discovery and development, and clinical development; for point-of-care in vitro diagnostics; for molecular genetic analysis and nucleic acid diagnostics; for cell separations including cell isolation and capture; and for bioresearch generally" (Nelson, col. 2, ll. 61-67). Nelson's devices comprise "at least an enrichment channel and a main electrophoretic flowpath . . . . The enrichment channel serves to enrich a particular fraction of a liquid sample for subsequent movement through the main electrophoretic flowpath" (Nelson, col. 2, ll. 48-53).

5. Nelson discloses a number of elements that correspond to claim 1's "component-binding moiety." Specifically, Nelson discloses that the enrichment channel can contain component-binding materials such as affinity adsorbents, metal chelating agents, Protein G, or antibodies, which can be bound to matrices of insoluble particles, or be membrane-bound (*see* Nelson, col. 5, l. 12, through col. 6, l. 53). Nelson discloses an example in which antibody-coated magnetic beads are used to bind to desired targets in the enrichment zone (*id.* at col. 21, l. 13, through col. 22, l. 13 (Example 2)). Nelson also exemplifies using magnetic beads to bind DNA in the enrichment zone (*id.* at col. 22, l. 15, through col. 23, l. 54 (Example 3)).

6. Nelson also discloses that, in certain embodiments, "affinity zones" can be placed in the main electrophoretic path to capture components of interest (Nelson, col. 17, ll. 9-33; col. 18, ll. 28-32; *see also* Figures 16 and 18). The affinity zones may contain the DNA-specific or protein-specific binding moieties similar to those used in the enrichment channel (*id.* at col.

17, ll. 33-47). Nelson does not disclose a separate reservoir or "source" for the component-binding moieties in either the enrichment channel or the main electrophoretic flowpath.

PRINCIPLES OF LAW

As stated in *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992):

> [T]he examiner bears the initial burden . . . of presenting a *prima facie* case of unpatentability. . . . After evidence or argument is submitted by the applicant in response, patentability is determined on the totality of the record, by a preponderance of evidence with due consideration to persuasiveness of argument.

When determining whether a claim is obvious, an examiner must make "a searching comparison of the claimed invention – *including all its limitations* – with the teaching of the prior art." *In re Ochiai*, 71 F.3d 1565, 1572 (Fed. Cir. 1995) (emphasis added). Thus, "obviousness requires a suggestion of all limitations in a claim." *CFMT, Inc. v. Yieldup Intern. Corp.*, 349 F.3d 1333, 1342 (Fed. Cir. 2003) (citing *In re Royka*, 490 F.2d 981, 985 (CCPA 1974)). Moreover, as the Supreme Court recently stated, "*there must be some articulated reasoning* with some rational underpinning to support the legal conclusion of obviousness." *KSR Int'l v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (2007) (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (emphasis added)).

ANALYSIS

We agree with Appellants that the Examiner has not explained where or why the cited references disclose or suggest a microfluidic device having a "source" for the component-binding moieties, wherein the source is separate from a binding region fluidly coupled to or within the first channel.

We note, as pointed out by the Examiner, that Nelson discloses the use of particle-borne component-binding moieties in different parts of its various microfluidic devices (*see* Findings of Fact 6 and 7, above).

However, Nelson's component-binding moieties are intended to remain in either the enrichment zone or affinity zones, with the component of interest being eluted therefrom (*see, e.g.,* Nelson at col. 21, l. 13, through col. 22, l. 13 (Example 2); col. 22, l. 15, through col. 23, l. 54 (Example 3)). Thus, since Nelson's component-binding moieties do not appear to move from their designated zones within the device, we see no apparent specific reason why a person of ordinary skill would have given Nelson's device a separate source of material to replenish the component-binding moieties. Moreover, we do not see any clearly articulated reasoning from the Examiner explaining why one of ordinary skill viewing the cited references would have considered it obvious for Nelson's device to contain a separate source, or reservoir, for the component-binding moieties.

It is well settled that the "Patent and Trademark Office (PTO) must consider all claim limitations when determining patentability of an invention over the prior art." *In re Lowry*, 32 F.3d 1579, 1582 (Fed. Cir. 1994). Because the Examiner has not explained why every limitation in claim 1 would have been obvious to a person of ordinary skill in the art, we agree with Appellants that the Examiner has not made out a case of prima facie obviousness. We therefore reverse the Examiner's obviousness rejection of claims 1-23.

REVERSED

lp

CALIPER LIFE SCIENCES, INC.
605 FAIRCHILD DRIVE
MOUNTAIN VIEW CA 94043-2234